

WHAT IS CLAIMED IS:

1. A device to analyze or reconstruct one or more signals I_j coming from one or more light sources, comprising at least:

- means to separate the signals I_j into at least two signals I_{j1} and I_{j2} ,
- at least two channels V_1 , V_2 respectively possessing a gain G_1 , G_2 and a dynamic range D_1 , D_2 , said channels having at least one sensor and being adapted to obtain, at output, a signal I'_{j1} , I'_{j2} with amplitudes $A_{j1}(t)$, $A_{j2}(t)$,
- a device for the processing of the signals I'_{j1} , I'_{j2} adapted to memorizing the amplitude $A_{j1}(t)$, $A_{j2}(t)$ of at least one of the two signals I'_{j1} , I'_{j2} when I'_{j1} and/or I'_{j2} is below a threshold value S_{\max} and to determining the amplitude $A_j(t)$ of the corresponding signal I'_j .

2. A device according to claim 1, wherein the signal-processing device works as follows:

for a signal I'_j corresponding to a given spatial position j

- if the amplitude $A_{j1}(t)$ is smaller than or equal to a threshold value S_{\max} then the processing device stores the pair of values $(A_{j1}(t), t)$,
- if the amplitude $A_{j1}(t)$ is greater than the threshold value S_{\max} , then the processing device stores the pair of values $(A_{j2}(t), t)$ and
- from the stored values $(A_{j1}(t), t)$, $(A_{j2}(t), t)$ the device determines the corresponding values of amplitude $A_j(t)$ in order to obtain the signal I'_j .

3. A device according to one of the claims 1 or 2, wherein said means of separating the signal I_j have an attenuation coefficient K determined so that K is smaller than or equal to the dynamic range of at least one of said channels V_1 , V_2 .

4. A device according to claim 3, wherein the means of separation have a value of attenuation coefficient K substantially equal to the dynamic range of at least one of said channels V_1 , V_2 .

5. A device according to one of the claims 1 to 4, wherein the sensors are streak cameras.

6. A device according to one of the claims 1 to 5, comprising n channels having a dynamic range D_n , $(n-1)$ means of separating the signal or signals I_j .

7. A streak camera with wide dynamic range according to one of the claims 1 to 6.

8. A method to analyze a signal I_j with a wide dynamic range, wherein it comprises at least the following steps:

(a) separating the signal to be analyzed into at least two signals I_{j1} , I_{j2} ,

(b) making each signal I_{j1} , I_{j2} go through at least one channel V_1 , V_2 comprising at least one sensor, each of the channels having a dynamic range D_1 , D_2 ,

(c) memorizing each signal I'_{j1} and I'_{j2} coming from the two channels V_1 and V_2 in digital form so as to obtain, for an index j , the values of the corresponding amplitudes $A_{j1}(t)$ and $A_{j2}(t)$,

(d) reading the values $A_{j1}(t)$ and comparing each of the values with a threshold value S_{max} ,

(e) if $A_{j1}(t)$ is smaller than the threshold value S_{max} , memorizing the value of the amplitude $A_{j1}(t)$ and the corresponding instant t ,

(f) if $A_{j1}(t)$ is greater than the threshold value S_{max} , then memorizing the value $A_{j2}(t)$ and the corresponding instant t ,

(g) determining the resultant amplitude signal $A_j(t)$ from the pairs of values having an amplitude $[(A_{j1}(t), t); (A_{j2}(t), t)]$.

9. A method according to claim 8 wherein the signal is split up into several signals I_j with j varying spatially, and wherein the steps (a) to (g) are reiterated for each of the values of j .

10. A method according to one of the claims 8 and 9 wherein the threshold value S_{max} corresponds to the value of saturation of the sensor with the smallest dynamic range.

11. A method according to one of the claims 8 to 10, wherein a sensor comprises a streak camera.

12. A method according to one of the claims 8 to 10, wherein the signal to be analyzed I_j corresponds to the projection of a single laser beam through a slot.

13. A method according to one of the claims 8 to 10, wherein the analyzed signal I_j is a linear image coming from a spectrometer or the section of a physical phenomenon.

14. A method according to one of the claims 8 to 10, wherein the signal to be analyzed I_j is a signal formed by a row of optic fibers, each of the fibers producing a signal having an index j .

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A device to analyze or reconstruct one or more signals I_j coming from one or more light sources, comprises: means to separate the signals I_j into at least two signals I_{j1} and I_{j2} , at least two channels V_1 , V_2 respectively possessing a gain G_1 , G_2 and a dynamic range D_1 , D_2 , said channels having at least one sensor and being adapted to obtain, at output, a signal I'_{j1} , I'_{j2} with amplitudes $A_{j1}(t)$, $A_{j2}(t)$, a device for the processing of the signals I'_{j1} , I'_{j2} adapted to memorizing the amplitude $A_{j1}(t)$, $A_{j2}(t)$ of at least one of the two signals I'_{j1} , I'_{j2} when I'_{j1} and/or I'_{j2} is below a threshold value S_{\max} and to determining the amplitude $A_j(t)$ of the corresponding signal I'_j . Streak camera with wide range of amplitude.

Figure 1.

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